



NPDES Permit Number: IN0000108

Report Issued: 11/27/00

InterLaB™ DMRQA Study Definitions:

The Reported Value is the value that the laboratory reported to ERA.

The ERA Assigned Values are established per the USEPA's guidelines contained in the National Standards for Water Proficiency Testing Studies Criteria Document, December 1998 as applicable.

The Acceptance Limits and Warning Limits are established per the USEPA's guidelines contained in the National Standards for Water Proficiency Testing Studies Criteria Document, December 1998.

The Performance Evaluation:

Acceptable = Reported Value falls within the Acceptance Limits.

Not Acceptable = Reported Value falls outside the Acceptance Limits.

Check for Error = Reported Value falls within the Acceptance Limits and outside of the Warning Limits

No Evaluation = Reported Value that can not be evaluated.

The Method Description is the method reported to ERA.

InterLaB™ DMRQA Study Discussion:

ERA's DMRQA Proficiency Testing Study 20 has been reviewed by ERA Senior Management and certified compliant with the requirements of the USEPA's National Standards for Water Proficiency Testing Studies Criteria Document (December 1998). ERA is a NIST NVLAP accredited PT Provider (Lab Code 2003860).

The DMRQA 20 results were examined for any study anomalies. A full review of all homogeneity, stability, and accuracy verification data was completed. All analytical verification data for all analytes in the DMRQA 20 standards met the acceptance criteria contained in the USEPA's National Criteria Document for Water Proficiency Testing Studies, December 1998.

The data submitted by participating laboratories was also examined for study anomalies. There were no anomalies found during the review of the study data.

If you have any questions regarding the DMRQA 20 study, please contact Shawn Kassner, InterLaB™ Program Coordinator, or Curtis Wood, ERA Quality Assurance Manager, at 1-800-372-0122.



DMRQA 20 Final Report

Report Issued: 11/27/00

NPDES Permit Number: IN0000108

Permit Holder: BP AMOCO OIL

2831 INDIANAPOLIS BLVD

WHITING, IN 46394-0710

Analyte	Performance Evaluation	Units	Reported Value	Assigned Value	Acceptance Limits	Warning Limits	Method Description	Voluntary	USEPA Lab Code	Study
Trace Metals										
Aluminum		µg/l	1440	1230 - 1640	1300 - 1570					DMRQA20
Arsenic		µg/l	432	361 - 507	385 - 482					DMRQA20
Cadmium		µg/l	643	549 - 730	579 - 700					DMRQA20
Chromium	Acceptable	µg/l	830	728 - 942	763 - 907		SM 3111B		IN01066	DMRQA20
Cobalt		µg/l	106	91.7 - 120	96.4 - 115					DMRQA20
Copper		µg/l	213	191 - 236	198 - 229					DMRQA20
Iron		µg/l	546	480 - 620	504 - 597					DMRQA20
Lead		µg/l	72.6	56.9 - 88.5	62.2 - 83.2					DMRQA20
Manganese		µg/l	3610	3250 - 4010	3380 - 3880					DMRQA20
Mercury		µg/l	0.879	0.538 - 1.23	0.653 - 1.11					DMRQA20
Nickel		µg/l	2560	2330 - 2850	2420 - 2760					DMRQA20
Selenium		µg/l	745	591 - 863	636 - 817					DMRQA20
Vanadium		µg/l	214	190 - 234	198 - 227					DMRQA20
Zinc		µg/l	773	684 - 870	715 - 839					DMRQA20
Demands										
TOC	Acceptable	mg/l	54.6	45.4 - 62.7	48.3 - 59.8		SM 5310 B		IN01066	DMRQA20
COD	Acceptable	mg/l	134	105 - 159	114 - 150		SM 5220 D		IN01066	DMRQA20
BOD	Acceptable	mg/l	87.4	43.1 - 128	57.2 - 114		SM 5210 B		IN01066	DMRQA20
CBOD		mg/l	73.5	33.0 - 114	46.5 - 101					DMRQA20





ENVIRONMENTAL
RESOURCE ASSOCIATES®

DMRQA 20 Final Report

NPDES Permit Number: IN0000108

Permit Holder: BP AMOCO OIL

2831 INDIANAPOLIS BLVD
WHITING, IN 46394-0710

Report Issued: 11/27/00

Analyte	Performance Evaluation	Units	Reported Value	Assigned Value	Acceptance Limits	Warning Limits	Method Description	Voluntary	USEPA Lab Code	Study
Nutrients										
Ammonia as N	Acceptable	mg/l	15.1	15.0	11.7 - 18.2	12.8 - 17.1	SM 4500-NH3 F		IN01066	DMRQA20
Nitrate as N		mg/l		7.44	5.87 - 8.86	6.37 - 8.36				DMRQA20
Ortho-phosphate as P	Acceptable	mg/l	2.71	2.66	2.26 - 3.08	2.40 - 2.94	SM 4500-P D		IN01066	DMRQA20
Total kjeldahl nitrogen		mg/l		6.87	4.78 - 8.83	5.46 - 8.16				DMRQA20
Total phosphorus as P		mg/l		9.09	6.91 - 10.6	7.53 - 10.0				DMRQA20
Miscellaneous Analytes										
Total Residual Chlorine		mg/l		0.763	0.572 - 0.954	0.636 - 0.890				DMRQA20
Cyanide, total		mg/l		0.689	0.478 - 0.886	0.546 - 0.818				DMRQA20
pH	Acceptable	S.U.	9.62	9.50	9.21 - 9.79	9.30 - 9.69	SM 4500-H+ B		IN01066	DMRQA20
Phenolics, total	Acceptable	mg/l	1.93	1.48	0.818 - 2.15	1.04 - 1.93	SM 5530 D		IN01066	DMRQA20
Non-filterable residue / TSS	Acceptable	mg/l	68.8	68.6	52.7 - 73.9	56.2 - 70.4	SM 2540 D		IN01066	DMRQA20
Grease & Oil (Infrared)	Not Acceptable	mg/l	63.0	54.5	37.1 - 60.8	41.1 - 56.9	SN 5520 C		IN01066	DMRQA20
Grease & Oil (Gravimetric)	Check for Error	mg/l	50.0	45.4	30.4 - 51.3	33.9 - 47.8	SM 5220 B		IN01066	DMRQA20



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QUALITY CONTROL STANDARDS / PROFICIENCY TESTING STUDIES

5540 Marshall St., Arvada, CO 80002 1-800-372-0122 fax 303-421-0159 info@eraqc.com www.eraqc.com

NVLAQ
lab code: 200386-0



DMRQA 20 Final Report

Report Issued: 11/27/00

NPDES Permit Number: IN0000108

Permit Holder: BP AMOCO OIL

2831 INDIANAPOLIS BLVD

WHITING, IN 46394-0710

Analyte	Performance Evaluation	Units	Reported Value	Assigned Value	Acceptance Limits	Warning Limits	Method Description	Voluntary	USEPA Lab Code	Study
Additional Analytes										
Antimony		µg/l	302		206 - 366	232 - 339				DMRQA20
Barium		µg/l	775		664 - 882					DMRQA20
Beryllium		µg/l	727		619 - 821	652 - 787				DMRQA20
Boron		µg/l	523		435 - 653					DMRQA20
Molybdenum		µg/l	501		430 - 573	454 - 549				DMRQA20
Silver		µg/l	306		262 - 351	277 - 336				DMRQA20
Strontium		µg/l	196		167 - 225	176 - 215				DMRQA20
Thallium		µg/l	794		641 - 920	687 - 874				DMRQA20
Calcium		mg/l	13.1		11.4 - 15.2	12.0 - 14.5				DMRQA20
Magnesium		mg/l	10.7		9.31 - 12.0	9.76 - 11.6				DMRQA20
Calcium hardness as CaCO3		mg/l	32.7		27.8 - 37.6					DMRQA20
Total Hardness as CaCO3		mg/l	76.8		68.4 - 85.8	71.3 - 82.9				DMRQA20



Page 5 of 5

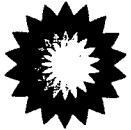
QUALITY CONTROL STANDARDS / PROFICIENCY TESTING STUDIES



5540 Marshall St., Arvada, CO 80002 1-800-372-0122 fax 303-421-0159 info@eraqc.com www.eraqc.com



Whiting Business Unit



BP Amoco Corporation
2815 Indianapolis Boulevard
P.O. Box 710
Whiting, IN 43694-0710

NPDES Permit # IN0000108

Indiana DEM / OWM
Oper. Assist. & Training Section
100 N. Senate Avenue
PO Box 6015
Indianapolis, IN 46206-6015

Attn: Barbara D. McDowell
(317) 233-6464 phone
(317) 232-8637 fax
bmcdowel@dem.state.in.us

DMRQA 20 Study – Corrective Action

The DMRQA 20 Proficiency Study results for permittee number IN0000108 were acceptable, except for the Grease & Oil (infrared) result. (A copy of all results is enclosed as DMRQA20.xls). Accordingly, a corrective action process was undertaken and this report briefly summarizes the positive outcome of this investigation.

Step 1: Identify what went wrong in the preparation and/or analytical procedure.

Three potential sources of error were investigated; contaminated glassware, dilution factor, and reference standard preparation. A review of the method with the technician and chemist showed that while contamination is always a concern, there is no evidence that this occurred and that the method clearly defines the steps required. A review of the dilution factor calculation and steps taken also showed no evidence of error. Finally, a review of Standard Method 5520 B and our internal method showed a difference in the components used to prepare the reference (i.e. calibration) standard. Standard Method 5520 B specifies the use of n-hexadecane, isooctane, and benzene. Our internal method specifies the use of n-hexadecane, isooctane, and chlorobenzene, and the reason for this is that these components are more indicative of the components in our effluent.

Step 2: Implement corrective action.

A new reference standard was prepared using the components specified in Standard Method 5520 B (i.e. n-hexadecane, isooctane, and benzene). A comparison of the absorbances between the two calibration standards showed higher absorbances for the Standard Method 5520 B calibration standard. This higher absorbance would lower the grease and oil results similar to magnitude of the difference between our reported DMRQA20 study result and the assigned value.

Step 3: Demonstrate the corrective action was successful.

Two ERA purchased standards were run using the new reference standard to validate the corrective action. One was a specially purchased ERA DMRQA 20 Corrective Action QC standard for Grease and Oil (ERA Lot # A99101) and the other was the quarterly ERA QC standard (3rd Qtr 2000, ERA Lot # 99105). Both results were within the performance acceptance limits:

<u>Standard</u>	<u>Run Value</u>	<u>Assigned Value</u>	<u>Acceptance Limits</u>
ERA Lot # A99101	67.6	59.3	35.6 – 74.1 mg/l
ERA Lot # 99105	54.9	54.7	32.8 – 68.4

Step 4: Submit brief report summarizing corrective action and results:

This report briefly summarizes the corrective action taken, which was to change the components used in making the reference/calibration standard for our grease and oil analysis. If you have any questions, please don't hesitate to contact me.

Respectfully submitted,



Ralph Moore
Whiting Laboratory Supervisor
(219) 473-3878 phone
(219) 473-3467 fax
moorerr@bp.com

enc

Natalie Grimmer, Environmental Engineer, Water / Waste Issues and Permitting
Kay Posegate, Laboratory Manager

Discharge Monitoring Report - Quality Assurance - 2000

EPA NPDES / IDEM

Provider		Environmental Resource Associates							
Rec'd 6/15/00									
Parameter		Date	Tech	Whiting Value	Assigned Value	Acceptance Limit	Performance Acceptance	Method Reference	
MINERALS									
total solids @ 105 C									
total dissolved solids @ 180 C									
conductivity @ 25 C									
alkalinity as CaCO3									
chloride									
fluoride									
sulfate									
potassium									
sodium									
pH		8/15/2000	J. O'Mara	9.62	9.50	9.21 - 9.79	Acceptable	SM 4500-H+ B	
HARDNESS									
total suspended solids		8/15/2000	J. O'Mara	68.8	68.6	52.7 - 73.9	Acceptable	SM 2540 D	
calcium									
magnesium									
calcium hardness as CaCO3									
total hardness as CaCO3									
GREASE & OIL									
grease & oil (gravimetric)		8/23/2000	R. Bertalan	50.0	45.4	30.4 - 51.3	Check for Error	SM 5520 B	
grease & oil (infrared)		8/22/2000	R. Bertalan	63.0	54.5	37.1 - 60.8	Not Acceptable	SM 5520 C	
TRACE METALS									
aluminum									
antimony									
arsenic									
barium									
beryllium									
boron									
cadmium									
chromium		8/15/2000	J. O'Mara	830	834	728 - 942	Acceptable	SM 3111 B	
cobalt									
copper									
iron									
lead									
manganese									
mercury									
molybdenum									
nickel									
selenium		8/29/2000	Microbac	230	241	188 - 280	Acceptable	SM 3111 B	
silver									
strontium									
thallium									
vanadium									
zinc									
DEMAND									
BOD		8/18/2000	J. O'Mara	87.4	85.4	43.1 - 128	Acceptable	SM 5210 B	
CBOD									
COD		8/12/2000	J. O'Mara	134	138	105 - 159	Acceptable	SM 5220 D	
TOC		8/18/2000	J. O'Mara	54.6	54.4	45.4 - 62.7	Acceptable	SM 5310 B	
total phosphorus as P									
TKN as N									
NUTRIENTS									
ammonia as N		8/30/2000	J. O'Mara	15.1	15.0	11.7 - 18.2	Acceptable	SM 4500-NH3 F	
NO3 + NO2 as N									
PO4 as P		8/30/2000	J. O'Mara	2.71	2.66	2.26 - 3.08	Acceptable	SM 4500-P D	
CYANIDE & PHENOL									
cyanide, total									
Phenol		8/30/2000	J. O'Mara	1.93	1.48	0.818 - 2.15	Acceptable	SM 5530 D	
RESIDUAL CHLORINE									
total residual chlorine		8/29/2000	Microbac	2.37	2.41	1.83 - 2.67	Acceptable	SM 4500Cl G	
NOTE:									
1 BP AMOCO OIL WHITING IN NPDES Permit Number IN0000108					BP AMOCO OIL WATLS LAB EPA Labcode IN01066 Provider is ERA				
					Microbac Laboratories, Inc EPA Labcode IN00063 Provider is APG				

Discharge Monitoring Report - Quality Assurance - 2000

EPA NPDES / IDEM

Provider		Environmental Resource Associates							
Rec'd 6/15/00									
Parameter		Date	Tech	Whiting Value	Assigned Value	Acceptance Limit	Performance Acceptance	Method Reference	
Original									
GREASE & OIL						ERA DMRQA 20			
grease & oil (infrared)		8/22/2000	R. Bertalan	63.0	54.5	37.1 - 60.8	Not Acceptable	SM 5520 C	
Corrective Action (new reference std)									
GREASE & OIL						ERA Lot # A99101 QC std			
grease & oil (infrared)		1/16/2001	R. Bertalan	67.6	59.3	35.6 - 74.1	Acceptable	SM 5520 C	
GREASE & OIL						ERA Lot # 99105 QC std 3rd Qtr 2000			
grease & oil (infrared)		1/16/2001	R. Bertalan	54.9	54.7	32.8 - 68.4	Acceptable	SM 5520 C	
NOTE:									
1 BP AMOCO OIL WHITING IN NPDES Permit Number IN0000108					BP AMOCO OIL WATLS LAB EPA Labcode IN01066		Provider is ERA		
					Microbac Laboratories, Inc EPA Labcode IN00063		Provider is APG		

INSTRUMENT HISTORY REPORT

Tag ID	FT99109A	Serial Number	HLC 885
ISO	<input type="checkbox"/>	Manufacturer	Honeywell
Test Type	Manual Analog	Model Number	ST3000
Test Date	04/26/2001	Function	Transmitter
Due Date		Instrument Type	DP Transmitter
Test Time		Temperature	
Final Status	Passed	Humidity	
Input Low	0	Output Low	4
Input High	7.16	Output High	20
Input Units	inWC	Output Units	ma
Input Mode	Actual	Output Mode	Actual

Recal. Spec.	2.000 %	Square Root	No
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As Found

Input	Output	%Error		
0	4	0.000%	Result	Passed
7.16	20	0.000%		
0	4	0.000%	Max. Dev.	0.000%
			Linearity	0.000%

As Left

Input	Output	%Error		
			Result	N/A
			Max. Dev.	
			Linearity	

Procedure

Custom

Testers

 ZTFN01
 ZDJL33

Reason for Work

Predictive

Actions Taken

Problem(s)

Comments

Quarterly test for EPA.

Testing Time (hours)

Work Order Number

Test Equipment Used

Manufacturer	Model Number	Serial Number	Due Date	Cert. Status
Taylor	7115P-160	9810141030	04/16/2000	Out Of Cert

INSTRUMENT HISTORY REPORT

Tag ID	FT99109A	Serial Number	HLC 885
ISO	<input type="checkbox"/>	Manufacturer	Honeywell
Test Type	Manual Event	Model Number	ST3000
Test Date	06/21/2000	Function	Transmitter
Due Date		Instrument Type	DP Transmitter
Test Time		Temperature	
Final Status	Passed	Humidity	
Final Status	Passed		
AF Result	Passed	AL Result	Passed

Procedure

Custom

Testers

ZTFN01

Reason for Work

Predictive

Actions Taken

Problem(s)

Comments

Quarterly test.

Testing Time (hours)

Work Order Number

Test Equipment Used

Manufacturer	Model Number	Serial Number	Due Date	Cert. Status
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bp

Whiting Business Unit

BP Amoco Corporation
2815 Indianapolis Blvd.
PO Box 710
Whiting, IN 46394-0710

Dept. of Environmental Mgmt.
Commissioner's Office

JUN 29 2001

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

June 27, 2001

Ms. Lori Kaplan
Commissioner
Indiana Department of Environmental Management
Office of the Commissioner
P.O. Box 6015
Indianapolis, IN 46206-6015

Notice of Change in Refinery Manager
Whiting Refinery – NPDES Permit IN0000108

Dear Ms. Kaplan:

In accordance with 327 IAC 5-2-22(c), this is to notify you that Ashok K. Jhawar has assumed the duties of Refinery Manager, effective June 1, 2001. Mr. Jhawar replaces Colin H.J. Maclean.

Sincerely,

Natalie R. Grimmer

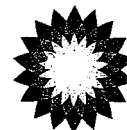
Natalie R. Grimmer
HSE Team Leader, Water

OFFICE
OF
WATER MANAGEMENT
IDEM
JUL 5 9 46 AM '01

bp

Colin H. J. Maclean

Business Unit Leader
Whiting Business Unit



BP
2815 Indianapolis Boulevard
Whiting, IN 46394
USA

**CERTIFIED MAIL
RETURN RECEIPT REQUESTED**

October 26, 2000

Indiana Department of Environmental Management
Office of Water Management
100 North Senate Street
P.O. Box 6015
Indianapolis, IN 46206-6015

Direct 219 473 3179
Fax 219 473 3504
Cell 219 320 0344
macleach@bp.com

NPDES Permit No. 0000108, Serials 001, 002, 003, and 004

Effluent quality data and Discharge Monitoring Report forms from the BP Amoco Oil Whiting Business Unit for the month of September, 2000, are attached. Effluent quality from the wastewater treatment plant for the month was excellent.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

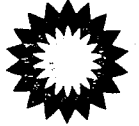
If you have any questions or need any additional information, please contact N. R. Grimmer at (219) 473-5417.

Sincerely,

Colin H. J. Maclean
Business Unit Leader

bp

Compliance
Lake Co.



Whiting Business Unit

BP Amoco Corporation
2815 Indianapolis Boulevard
P.O. Box 710
Whiting, IN 43694-0710

American Oil Co.

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

November 27, 2000

Mr. Michael Kuss
Indiana Department of Environmental Management
504 N. Broadway
Suite 418
Gary, Indiana 46402-1921

Re: BP Amoco Whiting Refinery NPDES Permit No. IN 0000108
Outfalls 001 and 002 Color Study Report - November 27, 2000

Dear Mr. Kuss,

Enclosed is the report of the study that the BP Amoco Whiting Refinery conducted on the color of the effluents from Outfall 001 and Outfall 002. This report addresses the Indiana Department of Environmental Management's concerns and the requests the Department made in the letter sent to BP Amoco dated March 8, 2000 from Assistant Commissioner Mr. Mathew Rueff.

If you have any questions regarding the report, please contact Natalie R. Grimmer at (219) 473-5417.

Sincerely,

Stephen D. Simko
Environmental Superintendent
Environmental, Health and Safety

Enclosure

cc: Ms. Hala Silvey, IDEM
Mr. Gary Starks, IDEM

NOV 29 2000

BP Amoco Whiting Refinery NPDES Permit No. IN 0000108
Outfalls 001 and 002 Color Study Report - November 27, 2000

Executive Summary

As requested by the Indiana Department of Environmental Management (IDEM), the BP Amoco Whiting Refinery conducted a study to assess the color of the effluents from Outfall 001 (treated wastewater) and Outfall 002 (once through non-contact cooling water). The study found that the colors of the effluents from Outfall 001 and Outfall 002 are consistent with the NPDES permit, the color of Outfall 001 is typical for the effluent from a biological wastewater treatment system, and the contrast of the color of the effluents from Outfall 001 and Outfall 002 compared to the Lake can be impacted by natural conditions such as meteorological conditions, lake levels, mixing effects and the refractive properties of light.

BP Amoco understands that the color of the effluents from Outfall 001 and Outfall 002 is an issue for IDEM. It is agreed that from an aesthetic perspective it is appropriate to minimize the color contrast of these outfalls in comparison to the Lake to the extent practicable and reasonable.

For example, even though the color study did not indicate that the refinery's final filter system has an impact on the color contrast of Outfall 001 in comparison to the Lake, BP Amoco is willing to take extra steps to further the final filter study. The initial study did identify some opportunities to improve the effectiveness of this system.

The major planned activity, however, is BP Amoco's proposal to install a diffuser some distance from the Lake Michigan shoreline. In BP Amoco's NPDES Permit Renewal Application submitted to IDEM in August 1994, we propose to install a multiport diffuser on the effluent from Outfall 001 that would provide more rapid and immediate mixing of the effluent into the Lake. Based on the proposed location of the diffuser and its impact on the mixing, a diffuser would lessen the visible contrast of the effluent from Outfall 001 in comparison to the Lake. Lessening the visible contrast of Outfall 001 would also minimize the contrast of the color of Outfall 002, since it is located near Outfall 001.

BP Amoco has recently approached IDEM's staff regarding moving forward towards renewing the refinery's NPDES permit which expired in May 1994. It is important for a number of reasons that this take place. One aspect is addressing the color issue that is the subject of this report.

Nov 29 1994

Introduction

On September 17, 1999 an IDEM representative conducted an inspection at the BP Amoco Whiting Refinery's Wastewater Treatment Plant to view the visual quality of Wastewater Treatment Plant Effluent Outfalls 001 and 002 which discharge to Lake Michigan. The inspector observed and noted that the effluent from Outfall 001 was brown in color and that the effluent from Outfall 002 was grey/white in color. In the inspection report, the effluent and receiving waters were evaluated as "marginal" compliance.

In response to the inspection report dated September 17, 1999, BP Amoco submitted a letter to IDEM (Mr. Michael Kuss) dated November 10, 1999 stating that BP Amoco disagreed with the characterization made of Outfall 001 and 002. BP Amoco provided data for Outfall 001 and 002 which substantiated that both Outfalls were well within permit limits at the time of the inspection. Additionally, possible reasons were suggested for the visual effects of the outfalls which included lake levels, meteorological conditions, mixing effects and refractive properties of light.

On March 8, 2000 BP Amoco received a letter from IDEM Assistant Commissioner Mr. Mathew Rueff which expressed a concern with the appearance of the BP Amoco Whiting Refinery's wastewater treatment plant outfalls. The letter requested that BP Amoco study the cause of the "discoloration" of the effluent from Outfall 001 and Outfall 002 and identify, evaluate, and propose corrective measures to eliminate the discoloration.

Upon receipt of the letter dated March 8, 2000, BP Amoco submitted a letter to IDEM's Mr. Michael Kuss on March 22, 2000 requesting a meeting to discuss IDEM's view on the issue in an effort to work cooperatively towards developing a plan to address IDEM's concerns. BP Amoco representatives subsequently met with IDEM's Mr. Michael Kuss and Ms. Hala Silvey on April 6, 2000 to discuss the basis of the concern expressed in the March 8, 2000 letter. In the meeting BP Amoco expressed the view that the issue of the color of the outfalls was not a violation of our permit, but that the Refinery was willing to address the Agency's concerns and agreed to provide IDEM with an outline of a plan to study the color of the two outfalls. On June 14, 2000 BP Amoco submitted the outline of the outfall color study plan to IDEM's Mr. Michael Kuss.

The results of the outfall color study are presented in the following sections.

Conclusions

Outfall 001-- Treated Wastewater

- The visual study of the effluent from Outfall 001 showed that there is a color contrast in comparing Outfall 001 to the Lake, which can vary with sunlight and the angle from which the outfall is visually observed.

- The benchmarking study indicated that this contrast is observable even at very low total suspended solids (TSS) and oil and grease (O&G) concentrations, and that this contrast is typical for the effluent from a biological wastewater treatment system.
- The wastewater treatment final filter system study identified opportunities that could improve the effectiveness of the design and operation of the system.
- The initial results of the study to assess the impact of the fluid bed incinerator scrubber water on the effluent indicate that there is not a significant impact to the effluent from the scrubber water.
- BP Amoco demonstrated in its NPDES Permit renewal Application submitted to IDEM in August 1994 that a multiport diffuser would provide more rapid and immediate mixing of the effluent into the Lake. Based on the proposed location of the diffuser and its impact on the mixing, a diffuser would lessen the visible contrast of the effluent from Outfall 001 compared to the Lake.

Outfall 002—Once Through Non-Contact Cooling Water

- The visual study of the effluent from Outfall 002 showed that there is a whitish color contrast in comparing Outfall 002 to the Lake, which can vary with sunlight and the angle from which the outfall is visually observed.
- The low lake levels and rock formations present at the location of Outfall 002 have a direct impact on the visual quality of Outfall 002. As the outfall hits the rocks, rapid turbulent mixing occurs which forms air bubbles and gives the outfall a whitish appearance.
- The one parameter identified that could potentially impact the color of Outfall 002 is O&G. However, this parameter was measured at low levels well below permit limits when the whitish appearance of Outfall 002 was observed.
- There have been no additional factors identified that would impact the color of Outfall 002.

Discussion

I. Wastewater Treatment Plant Effluent (Outfall 001) Study Plan Element

A. Visual Color

Study of the Effluent from Outfall 001.

Photographs were taken of the effluent from Outfall 001 at a fixed location (eastern fence line of the wastewater treatment plant looking down onto the outfall) on September 6,

September 19, September 29, and October 6, 2000 at around 2PM CT each day using a digital camera. A copy of these photographs are attached (see Figures 1, 2, 3, 4). Upon review of these photographs, one can see the effluent plume from Outfall 001 by the color contrast against the Lake in each photograph.

A historical photograph was found that was taken by a 35 mm camera from about the same fixed location at the fence line but at a higher elevation. Figure 5 depicts a photograph taken of Outfall 001 on April 21, 1994. The same color contrast can be seen on this photo as with the photos that were recently taken as shown in Figures 1, 2, 3, and 4. An additional photograph was found, believed to be taken in 1991, of Outfall 001 from a boat looking at angle southeast of the outfall, show in figure 6. The effluent plume can also be seen in this photograph as a contrast against the Lake.

The sunlight will also have an effect upon the observed color of the effluent from the Outfall and the Lake. Depending upon the amount of sunlight present and the angle from which the photograph is taken, the color of the effluent and the Lake can vary. This is evident from the slight variations in color seen of Outfall 001 and the Lake in the photographs taken from the different fixed locations on the different days.

B. Benchmarking Study of the "Normal" Color of Effluent from a Biological Wastewater Treatment Plant

Total suspended solids (TSS) and oil and grease (O&G) are parameters that potentially could have an impact on the visual quality of an effluent. The concentration of these parameters in the effluent on the days in which the photographs in Figures 1, 2, 3, and 4 were taken are documented in Table 1. As evident from the table, these parameters were within effluent permit limits on the day the photographs were taken.

The effluent TSS and O&G for Outfall 001 were also within permit limits on April 21, 1994 when the photograph in Figure 5 was taken. Outfall 001 TSS and O&G concentrations for April 18 - April 21, 1994 are listed in Table 2. The TSS of Outfall 001 was 7 ppm the three days prior to and 6 ppm the day the photograph was taken. At this very low TSS concentration and O&G, a contrast of the color of the outfall can still be seen in comparison to the Lake in the photograph.

For BP Amoco's NPDES permit application submitted in 1994, a color analysis was run on the effluent from Outfall 001. The result for Outfall 001 was <5 color units. The typical value of color units from a biological activated sludge plant ranges from <5 to 100. A review of other industry permit applications indicates that color units can run as high as 500 color units on effluents from biological wastewater treatment plants. The BP Amoco Refinery's results were 100x less than this maximum value identified.

These above results support the conclusion that a “normal” effluent from a biological wastewater treatment system will potentially have a contrasting color in comparison to the receiving body of water.

C. Evaluation of the BP Amoco Refinery's Wastewater Treatment Plant's Final Filter System

The BP Amoco Whiting Refinery developed a plan to study the effectiveness of the design and the operation of the wastewater treatment plant's final filter system. The final filter system can have an impact on effluent TSS. The plan consisted of collecting inlet and outlet turbidity data, internal physical inspections and repair, and assessing the cause of any issues identified.

A series of turbidity comparison tests were run. The inlet and outlet turbidities on each of the eight final filters were measured. Initial testing was performed under abnormally low flow conditions, and on two of the filters (203 and 204) the outlet turbidity was much closer to that of the inlet turbidity. When the filters were tested under normal flow conditions, the outlet turbidities on all the filters were lower than the inlets.

For the second phase of the filter study, a plan was initiated to take the filters out of service for inspection of internal components and filter media quality. An internal inspection conducted on Filter 203 identified that the filter had media loss. The media in the filter is to be replaced. As scheduling allows, plans are in progress to inspect the other filters.

The media loss in Filter 203 was evaluated. It was determined that the media loss was most likely due to issues with the backwash control procedures. In order to prevent potential media loss in the future, the filter backwash procedure is being reviewed and revised as appropriate. Additionally, the backwash control system is being analyzed. Any changes to the backwash procedures will be reviewed with the Lakefront operators and placed in the Lakefront Training Manual.

D. Impact of Fluid Bed Incinerator Scrubber Water as a Component of the Effluent

The scrubber water from the refinery's fluid bed incinerator is routed directly to the wastewater treatment plant's interceptor box in which it mixes with the effluent from the wastewater treatment plant and the resultant flow is then discharged into the Lake via Outfall 001 under the refinery's NDPES permit. Because the scrubber water mixes directly with the wastewater treatment plant effluent, it can potentially have an impact on the visual quality of Outfall 001. Our study plan was to include a visual comparison of the effluent from Outfall 001 when the incinerator is running and when it is shutdown.

The BP Amoco Whiting Refinery's fluid bed incinerator was in operation during the entire outfall color study timeframe; therefore, the photographs of the effluent from Outfall 001 depicted in Figures 1, 2, 3, and 4 are when the incinerator scrubber water was mixed with the wastewater treatment plant effluent.

However, based on solids content, the impact of the incinerator scrubber water to the effluent from Outfall 001 should be insignificant. The turbidity of the incinerator scrubber water is measured by the wastewater treatment plant operators and the results are typically at <20 ppm. The ratio of TSS to turbidity averages around 1.2 to 1.0. Therefore, the average TSS of the scrubber water would be approximately <24 ppm. At a flow of 0.56 mmgals/day of scrubber water and an average Outfall 001 effluent flow of 18.5 mmgals/day (based on September 2000 data), the contribution of solids to Outfall 001 from the scrubber water would be minimal.

E. Impact of the Proposed Diffuser on Effluent Color

The BP Amoco Whiting Refinery submitted a NPDES Permit Renewal Application to IDEM in August 1994. A part of the permit renewal application (Volume II Mixing Zone Demonstration) included the refinery's proposal to install a multiport diffuser for the discharge of the treated effluent from Outfall 001. BP Amoco believes and has demonstrated by modeling that a multiport diffuser provides more rapid and immediate mixing than is provided by the existing outfall.

Specific benefits of a multiport diffuser as outlined in the refinery's permit renewal application include:

- The diffuser, by design, provides even more rapid and immediate mixing in a small area.
- The diffuser would be located offshore, thereby minimizing plume contact with the Lake Michigan shoreline.
- The diffuser site would be exposed to the general nearshore current/circulation patterns that enhance local mixing.
- The discharge would be present in deeper waters completely submerged and surrounded by lake water available for entrainment (induced mixing). Vertical mixing throughout the water column would be achieved as the positively buoyant plume rises toward the surface.

Based on the proposed location of the diffuser and its impact on the effluent discharge into the Lake, the diffuser would lessen the visible contrast of the effluent from Outfall 0001 compared to the Lake.

II. Once Through Non-Contact Cooling Water (Outfall 002) Study Plan Element

A. Visual Color Study of the Effluent from Outfall 002

Photographs were taken of Outfall 002 from a fixed location (at the eastern fence line of the wastewater treatment plant looking down onto the outfall) on September 6, September 19, September 29, and October 6 at around 2PM CT each day. These photographs are attached (see Figures 7, 8, 9, and 10). Upon review of these photographs, the effluent plume appears whitish in contrast against the Lake. As also can be seen, this color variation is about the same in each photograph. As discussed for Outfall 001, the sunlight and the angle from which the photographs are taken can have an effect upon the observed color of the effluent and the Lake.

B. Evaluation of Background Lake Conditions to Assess their Impact on the Color of Outfall 002

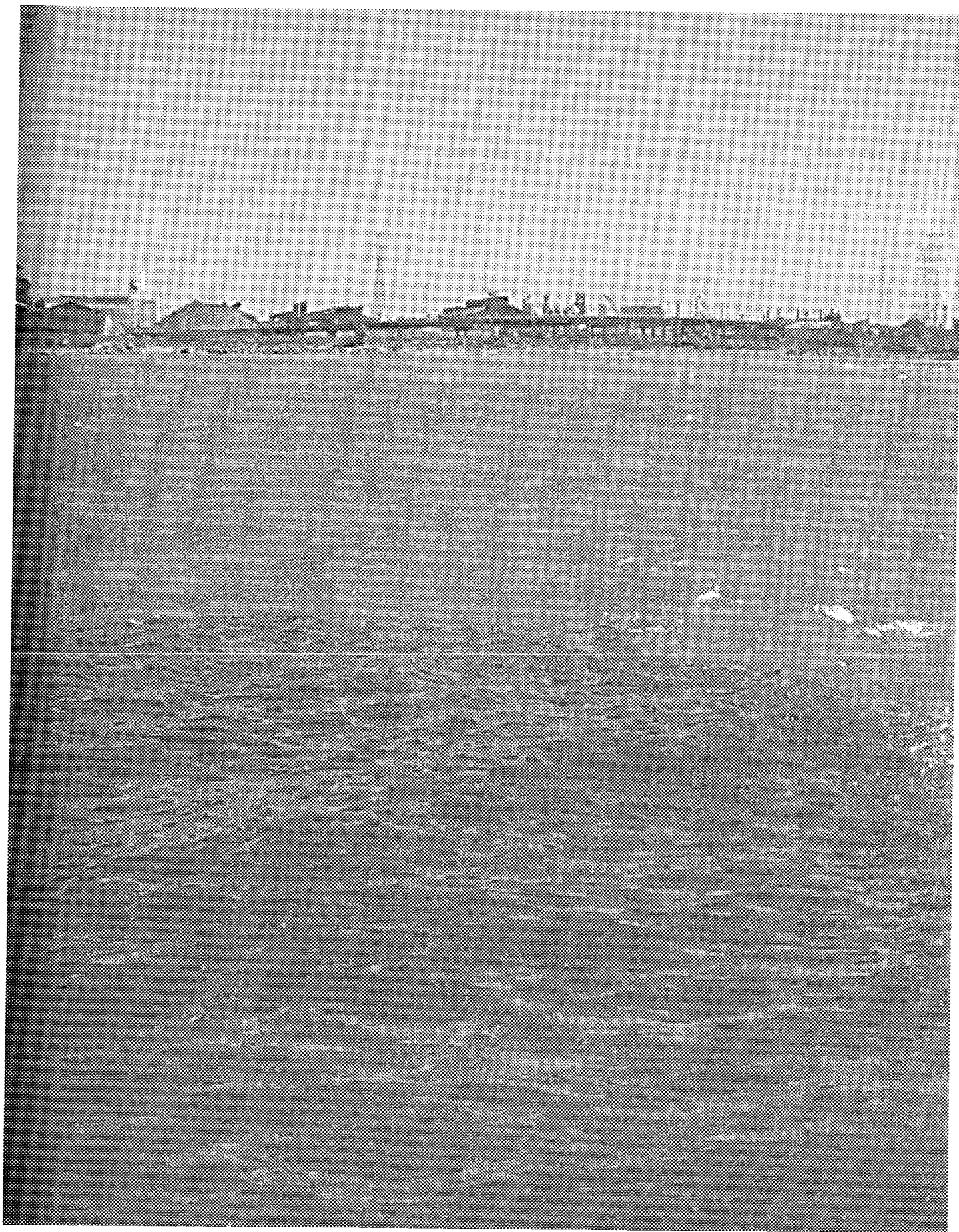
It is evident that the low lake levels and rock formations are having a direct impact on the visual quality of Outfall 002. The air bubbles forming from Outfall 002 hitting the rocks, which are causing rapid like turbulent mixing, can clearly be seen by a visual look at the outfall. These air bubbles can give a whitish appearance to this outfall. The amount of rocks present at the location of Outfall 002 can be seen in the photographs in Figures 7, 8, 9 and 10. When the level of the lake is lower, the impact from the rocks is more severe. In the last 24 months the average Lake Michigan water level has stayed below 580 feet. The water level was above 580 feet in the 33 months prior, with elevations as high as 582.8 feet.

C. Identification of Factors that Potentially Affect the Color of the Outfall

The one parameter that could have a potential impact on the visual quality of this effluent is O&G. The outlet O&G results for Outfall 002 during the month of September 2000 in which the photographs were taken ranged from <0.3 - 0.5 ppm. The delta (outlet - inlet) O&G results were from <0.3 - 0.1 ppm for the same month. The delta O&G permit limit is 5 ppm. Therefore, the O&G results for Outfall 002 were essentially the same as the Lake's background levels and well below permit limits.

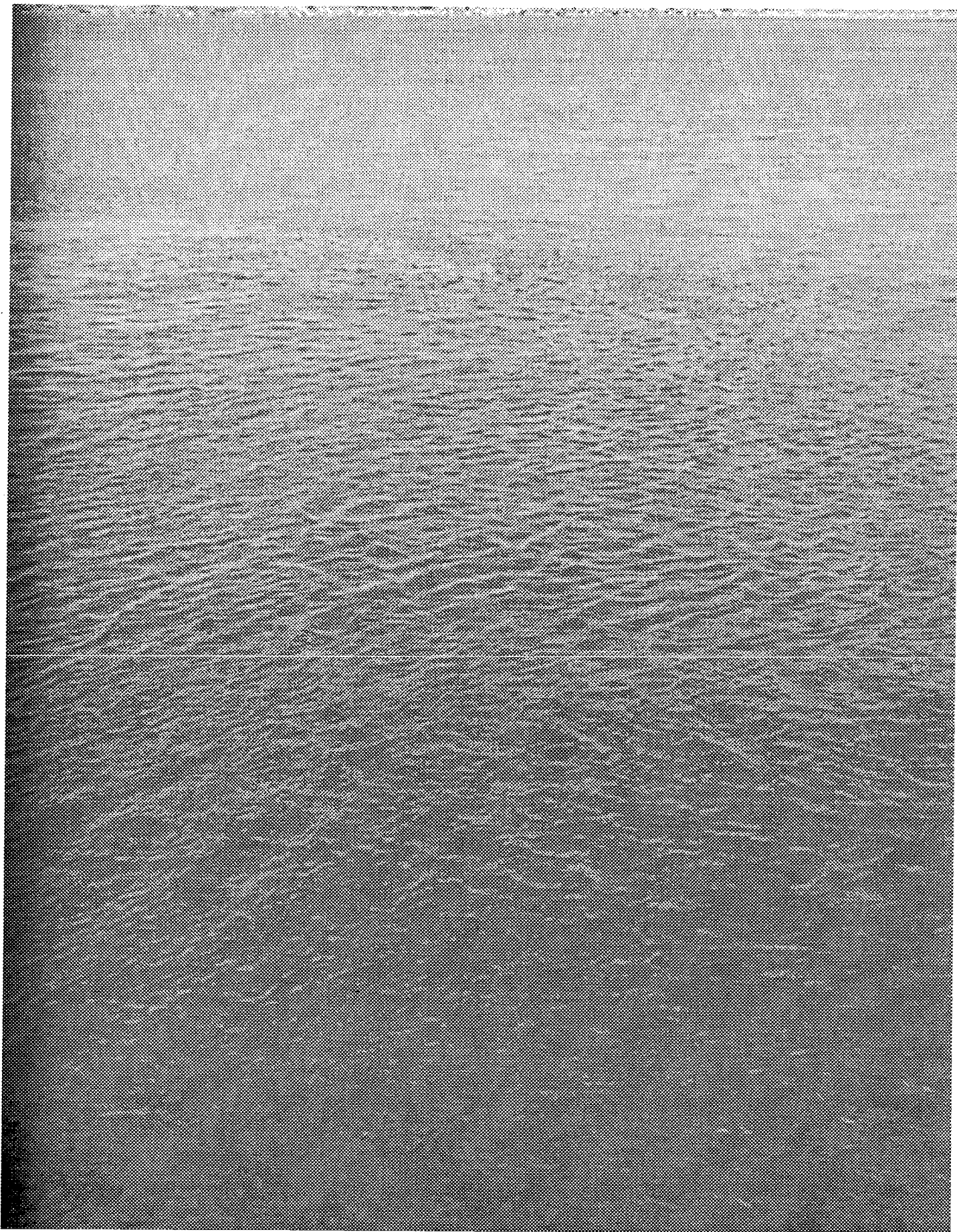
No additional factors were identified during the study that could impact the visual quality of the effluent from Outfall 002.

Figure 1



Outfall 001 - September 6, 2000

Figure 2



Outfall 001 - September 19, 2000